WHAT IS CLAIMED IS:

1. A method for electro-optically inspecting and determining internal properties and characteristics of a longitudinally moving rod of material, comprising the steps of:

(a) guiding the longitudinally moving rod of material along its longitudinal axis by a rod guiding unit, along an optical path within a transparent passageway, said optical path and said transparent passageway coaxially extend along said longitudinal axis of the moving rod of material and pass through an electro-optical transmission module;

(b) generating a focused beam of electromagnetic radiation by an illumination unit of said electro-optical transmission module, such that said focused beam is transmitted through a first side of said transparent passageway and incident upon the rod of material longitudinally moving within said transparent passageway;

(c) illuminating a volumetric segment of the longitudinally moving rod of material by said incident focused beam, such that at least part of said incident focused beam is affected by and transmitted through said volumetric segment and then transmitted through a second side of said transparent passageway, for forming a rod material volumetric segment transmitted beam; and

(d) detecting said rod material volumetric segment transmitted beam by a detection unit of said electro-optical transmission module, for forming a detected rod material volumetric segment transmitted beam useable for determining the internal properties and characteristics of the longitudinally moving rod of material.

2. The method of claim 1, wherein step (b), said generating said focused beam of electromagnetic radiation by said illumination unit further includes a procedure for monitoring temperature and compensating for temperature changes in a critical region of operation of said illumination unit.

3. The method of claim 2, wherein a said critical region of operation is in immediate vicinity of said volumetric segment of the rod of material longitudinally moving along said optical path within said transparent passageway.

4. The method of claim 2, wherein step (b), operation of said illumination unit including said procedure for monitoring temperature and compensating for temperature changes is based on a temperature change monitoring and compensating electro-optical feedback loop.

5. The method of claim 1, wherein step (d), said detecting said rod material volumetric segment transmitted beam by said detection unit further includes a procedure for monitoring temperature and compensating for temperature changes in a critical region of operation of said detection unit.

6. The method of claim 5, wherein a said critical region of operation is in immediate vicinity of said volumetric segment of the rod of material longitudinally moving along said optical path within said transparent passageway.

7. The method of claim 1, wherein step (a), said optical path and said transparent passageway coaxially extend along said longitudinal axis of the moving rod of material and pass through a plurality of two electro-optical transmission modules, such that longitudinal and angular or circumferential positions of said two electro-optical transmission modules, relative to each other, and relative to said transparent passageway within which extends said coaxial optical path, are spatially staggered or displaced along said coaxial optical path, along which the longitudinally moving rod of material is guided by said rod guiding unit.

8. The method of claim 1, further comprising a procedure for preventing, eliminating, or reducing, radially directed vibrating of the longitudinally moving rod of material during electro-optically inspecting the longitudinally moving rod of material.

9. The method of claim 1, wherein following step (a) and preceding step (b), there is inserted the step of generating a continuous vortical type of flow of gas within and along said transparent passageway by a vortex generating mechanism, such that said flowing gas rotates as a vortex around said optical path and around the longitudinally moving rod of material, and flows downstream within and along said transparent passageway in same longitudinal direction of the longitudinally moving rod of material, such that said flowing gas radially impinges upon the longitudinally moving rod of material within said transparent passageway; said flowing gas radially impinging upon the longitudinally moving rod of material prevents, eliminates, or reduces, radially directed vibrating of the longitudinally moving rod of material during the electro-optically inspecting the longitudinally moving rod of material.

10. A method for preventing, eliminating, or reducing, radially directed vibrating of a longitudinally moving rod of material during electro-optically inspecting the longitudinally moving rod of material, comprising the steps of:

(a) guiding the longitudinally moving rod of material along its longitudinal axis by a rod guiding unit, along an optical path within a transparent passageway, said optical path and said transparent passageway coaxially extend along said longitudinal axis of the longitudinally moving rod of material and pass through an electro-optical inspection apparatus used for electro-optically inspecting the longitudinally moving rod of material; and

(b) generating a continuous vortical type of flow of gas within and along said transparent passageway by a vortex generating mechanism, such that said flowing gas rotates as a vortex around said optical path and around the longitudinally moving rod of material, and flows downstream within and along said transparent passageway in same longitudinal direction of the longitudinally moving rod of material, such that said flowing gas radially impinges upon the longitudinally moving rod of material within said transparent passageway;

said flowing gas radially impinging upon the longitudinally moving rod of material prevents, eliminates, or reduces, radially directed vibrating of the longitudinally moving

rod of material during the electro-optically inspecting the longitudinally moving rod of material.

11. A device for electro-optically inspecting and determining internal properties and characteristics of a longitudinally moving rod of material, comprising:

(a) a rod guiding unit for guiding the longitudinally moving rod of material along its longitudinal axis, along an optical path within a transparent passageway, said optical path and said transparent passageway coaxially extend along said longitudinal axis of the moving rod of material; and

(b) an electro-optical transmission module through which pass said optical path and said transparent passageway, said electro-optical transmission module includes:

(i) an illumination unit for generating a focused beam of electromagnetic radiation, such that said focused beam is transmitted through a first side of said transparent passageway and incident upon the rod of material longitudinally moving within said transparent passageway, said incident focused beam illuminates a volumetric segment of the longitudinally moving rod of material, such that at least part of said incident focused beam is transmitted through said volumetric segment and through a second side of said transparent passageway, for forming a rod material volumetric segment transmitted beam; and

(ii) a detection unit for detecting said rod material volumetric segment transmitted beam, for forming a detected rod material volumetric segment transmitted beam useable for determining the internal properties and characteristics of the longitudinally moving rod of material.

12. The device of claim 11, wherein said illumination unit for said generating said focused beam of electromagnetic radiation further includes components for monitoring

temperature and compensating for temperature changes in a critical region of operation of said illumination unit.

13. The device of claim 12, wherein a said critical region of operation is in immediate vicinity of said volumetric segment of the rod of material longitudinally moving along said optical path within said transparent passageway.

14. The device of claim 12, wherein operation of said illumination unit including said components for monitoring temperature and compensating for temperature changes is based on a temperature change monitoring and compensating electro-optical feedback loop.

15. The device of claim 11, wherein said detection unit for said detecting said rod material volumetric segment transmitted beam further includes a procedure for monitoring temperature and compensating for temperature changes in a critical region of operation of said detection unit.

16. The device of claim 15, wherein a said critical region of operation is in immediate vicinity of said volumetric segment of the rod of material longitudinally moving along said optical path within said transparent passageway.

17. The device of claim 11, wherein said optical path and said transparent passageway pass through a plurality of two electro-optical transmission modules, each said electro-optical transmission module includes a said illumination unit and a said detection unit.

18. The device of claim 11, wherein said optical path and said transparent passageway pass through a plurality of two electro-optical transmission modules, such that longitudinal and angular or circumferential positions of said two electro-optical transmission modules, relative to each other, and relative to said transparent passageway within which extends said coaxial optical path, are spatially staggered or displaced along

said coaxial optical path, along which the longitudinally moving rod of material is guided by said rod guiding unit.

19. The device of claim 11, wherein said rod guiding unit further includes a vortex generating mechanism for generating a continuous vortical type of flow of gas within and along said transparent passageway, such that said flowing gas rotates as a vortex around said optical path and around the longitudinally moving rod of material, and flows downstream within and along said transparent passageway in same longitudinal direction of the longitudinally moving rod of material, such that said flowing gas radially impinges upon the longitudinally moving rod of material within said transparent passageway; said flowing gas impinging upon the longitudinally moving rod of material prevents, eliminates, or reduces, radially directed vibrating of the longitudinally moving rod of material, during the electro-optically inspecting the longitudinally moving rod of material.

20. A device for preventing, eliminating, or reducing, radially directed vibrating of a longitudinally moving rod of material during electro-optically inspecting the longitudinally moving rod of material, comprising: a rod guiding unit for guiding the longitudinally moving rod of material along its longitudinal axis, along an optical path within a transparent passageway, said optical path and said transparent passageway coaxially extend along said longitudinal axis of the longitudinally moving rod of material and pass through an electro-optical inspection apparatus used for electro-optically inspecting the longitudinally moving rod of material, said rod guiding unit includes a vortex generating mechanism for generating a continuous vortical type of flow of gas within and along said transparent passageway, such that said flowing gas rotates as a vortex around said optical path and around the longitudinally moving rod of material, and flows downstream within and along said transparent passageway in same longitudinal direction of the longitudinally moving rod of material, such that said flowing gas radially impinges upon the longitudinally moving rod of material within said transparent passageway; said flowing gas impinging upon the longitudinally moving rod of material prevents, eliminates, or reduces, radially directed vibrating of the longitudinally moving rod of material, during the electro-optically inspecting the longitudinally moving rod of material.